

Environmental Health and Human Physiology

Environmental Science · Answer Key · 12 Questions

1. Which specific atmospheric pollutant is known to form carboxyhemoglobin in human blood, thereby reducing the oxygen-carrying capacity of the body?

- A) Sulfur dioxide
- B) Carbon monoxide**
- C) Nitrogen dioxide
- D) Ozone

2. In the context of heavy metal toxicity, which enzyme is primarily inhibited by lead (Pb) exposure, leading to the disruption of heme biosynthesis and subsequent anemia?

- A) Delta-aminolevulinic acid dehydratase**
- B) Cytochrome c oxidase
- C) Superoxide dismutase
- D) Pyruvate kinase

3. What is the biological mechanism by which perfluorooctanoic acid (PFOA) is classified as an endocrine disruptor in humans?

- A) Direct binding to insulin receptors
- B) Interaction with peroxisome proliferator-activated receptors (PPARs)**
- C) Inhibition of thyroid peroxidase
- D) Activation of estrogen receptors

4. Fine particulate matter (PM_{2.5}) exposure is associated with systemic inflammation; which systemic inflammatory marker is most commonly elevated in long-term epidemiological studies?

- A) C-reactive protein (CRP)**
- B) Creatinine
- C) Albumin
- D) Bilirubin

5. The bioaccumulation of methylmercury in humans primarily affects the central nervous system due to its high affinity for which chemical functional group found in proteins?

- A) Carboxyl group
- B) Hydroxyl group
- C) Sulfhydryl (thiol) group**
- D) Phosphate group

6. Which organ is the primary site of metabolism for polycyclic aromatic hydrocarbons (PAHs), and which enzyme system is responsible for their activation into carcinogenic epoxides?

A) Liver; Cytochrome P450

- B) Kidneys; Monoamine oxidase
- C) Lungs; Glutathione S-transferase
- D) Skin; Dehydrogenase

7. Chronic exposure to arsenic in drinking water is clinically associated with the development of which specific type of skin lesion?

A) Psoriatic plaques

B) Palmoplantar hyperkeratosis

- C) Atopic dermatitis
- D) Melanoma in situ

8. What is the specific mode of action for dioxins (TCDD) that leads to their toxic effects on human health?

A) Binding to the aryl hydrocarbon receptor (AhR)

- B) Inhibition of DNA polymerase
- C) Blocking of voltage-gated calcium channels
- D) Disruption of mitochondrial electron transport

9. Which atmospheric condition or pollutant is the primary catalyst for the formation of ground-level ozone, which exacerbates human respiratory distress?

A) Particulate matter and methane

B) Nitrogen oxides and volatile organic compounds (VOCs)

- C) Carbon dioxide and water vapor
- D) Chlorofluorocarbons and noble gases

10. In environmental toxicology, what is the significance of the 'half-life' of polychlorinated biphenyls (PCBs) in the human adipose tissue?

A) They are rapidly excreted in urine

B) They persist due to high lipophilicity and resistance to enzymatic degradation

- C) They are metabolized into harmless amino acids
- D) They are sequestered in the bone matrix only

11. Cadmium toxicity specifically targets which organ system, causing proximal tubular dysfunction and increased urinary excretion of low-molecular-weight proteins?

A) Cardiac system

B) Renal system

- C) Endocrine system
- D) Integumentary system

12. Which neurotoxic effect is commonly associated with chronic inhalation of manganese (Mn) in industrial settings, mimicking Parkinson's disease?

A) Manganism

B) Peripheral neuropathy

C) Multiple sclerosis

D) Altered circadian rhythm